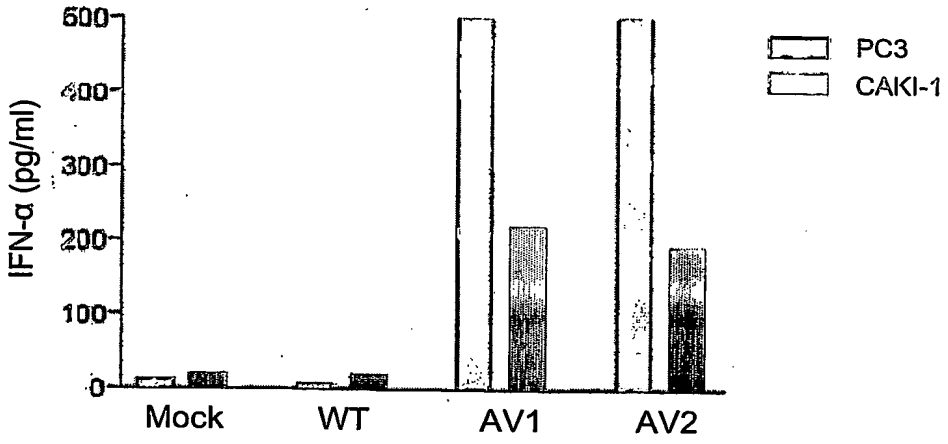
A



B

	LD50 (pfu)		
	WT	**AV1**	**AV2**
IN			
Balb/c	1×10^4	3×10^8	2.5×10^8
CD-1	1×10^8	2×10^8	nd
IV			
CD-1	1×10^8	8×10^9	nd

C

	PFU	***Morbidity***	***Mortality***
WT VSV	10^1	3/3	3/3
AV2	10^7	0/3	0/3
AV@(10^6) + WT VSV	10^1	0/3	0/3
	10^2	0/3	0/3
	10^3	0/3	0/3

FIGURE 1A-C

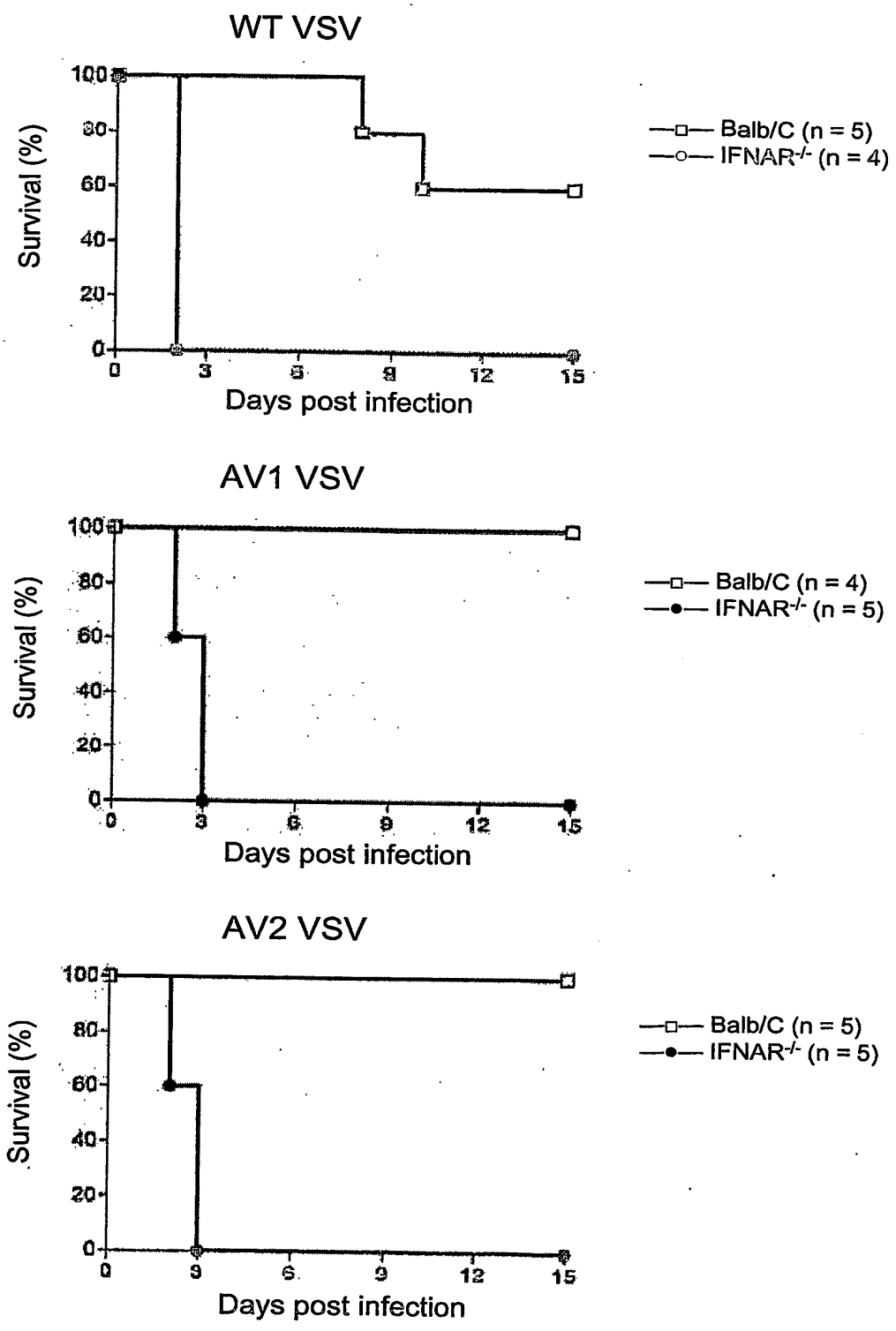
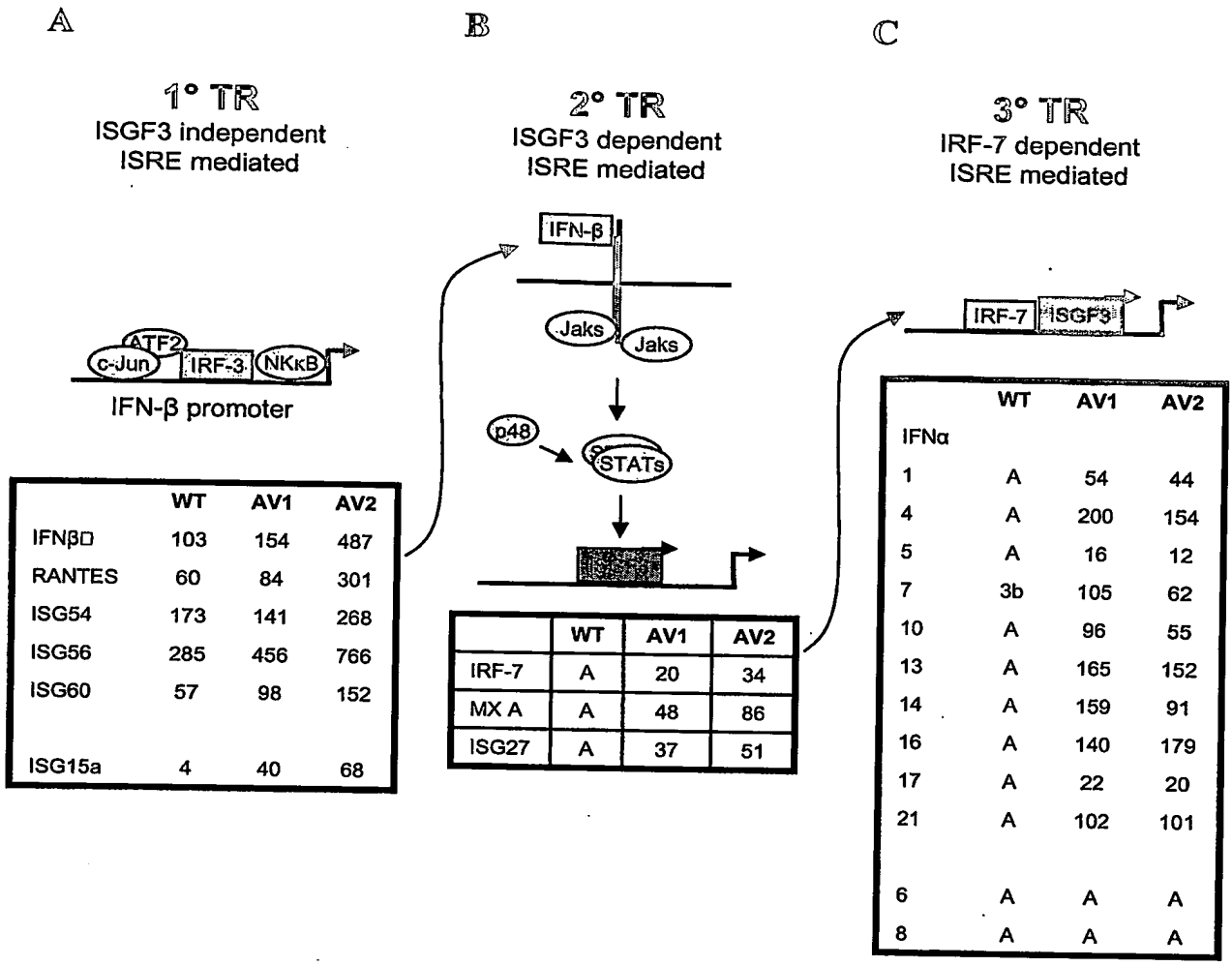

WT VSV
Survival (%)
100
80
60
40
20
0
0
3
6
9
12
15
Days post infection
Balb/C (n = 5)
IFNAR-/- (n = 4)
AV1 VSV
Survival (%)
Days post infection
Balb/C (n = 4)
IFNAR-/- (n = 5)
AV2 VSV
Survival (%)
Days post infection
Balb/C (n = 5)
IFNAR-/- (n = 5)

FIGURE 1D



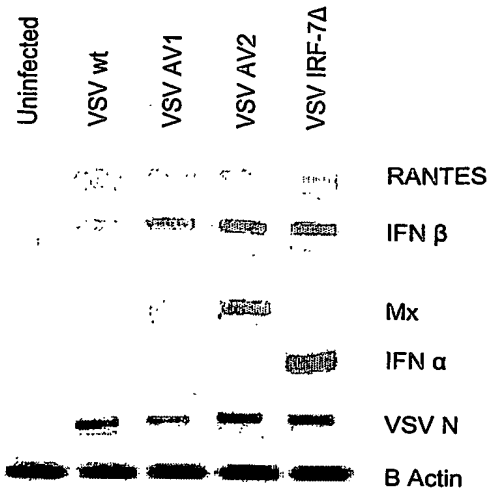
	WT	AV1	AV2
IFNβ□	103	154	487
RANTES	60	84	301
ISG54	173	141	268
ISG56	285	456	766
ISG60	57	98	152
ISG15a	4	40	68

	WT	AV1	AV2
IRF-7	A	20	34
MX A	A	48	86
ISG27	A	37	51

IFNα	WT	AV1	AV2
1	A	54	44
4	A	200	154
5	A	16	12
7	3b	105	62
10	A	96	55
13	A	165	152
14	A	159	91
16	A	140	179
17	A	22	20
21	A	102	101
6	A	A	A
8	A	A	A

FIGURE 2A-C

D



E

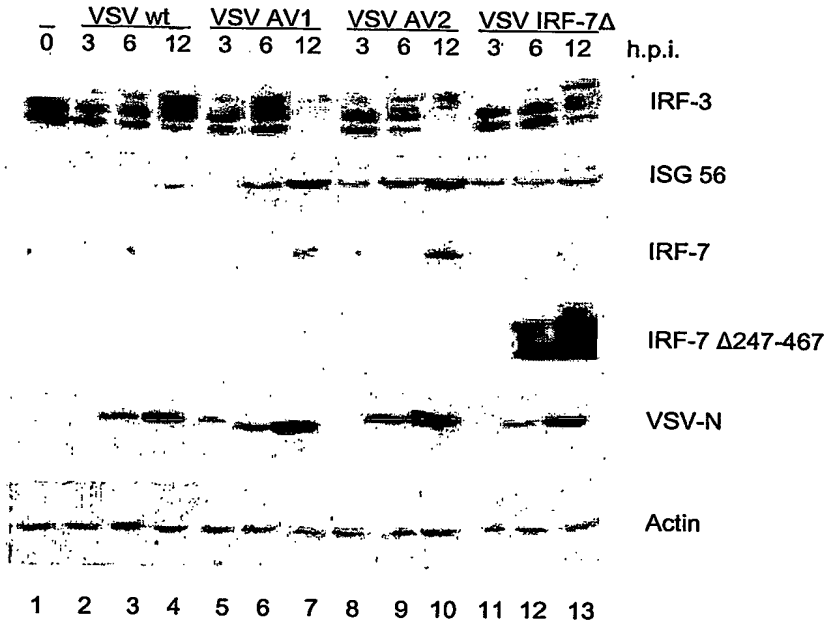


FIGURE 2D-E

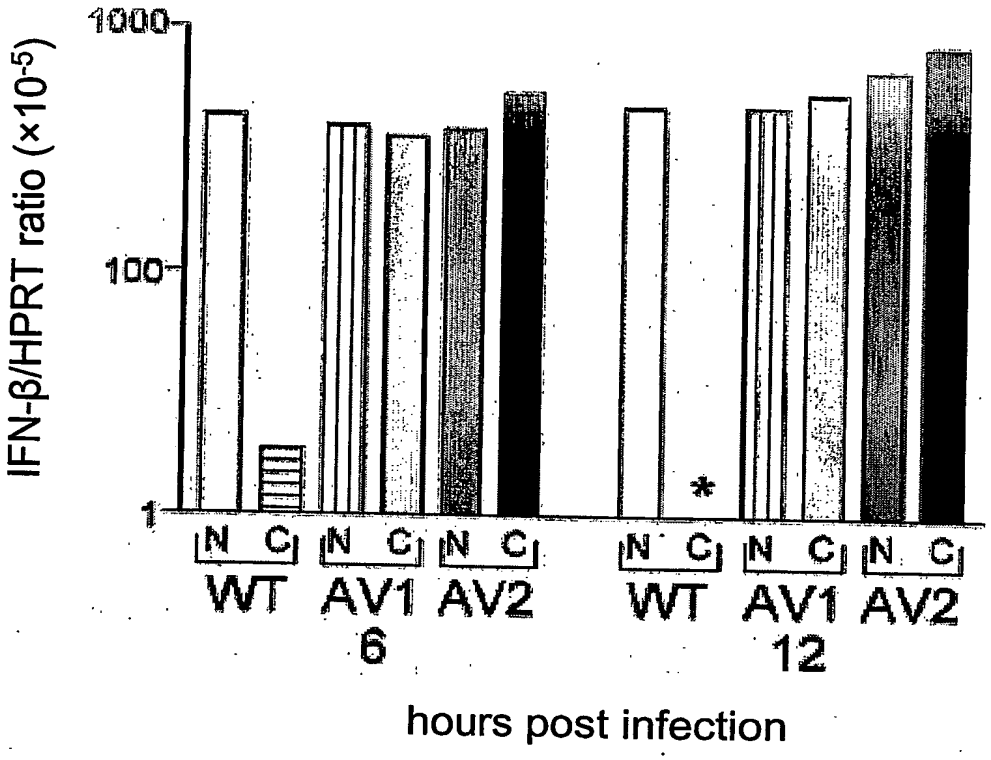
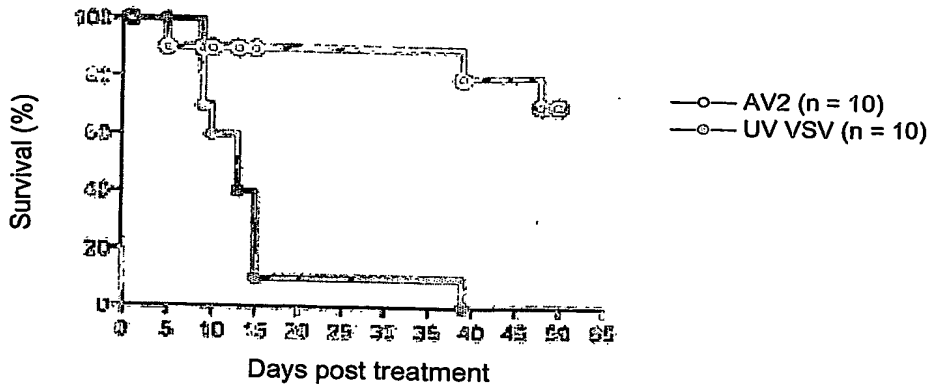
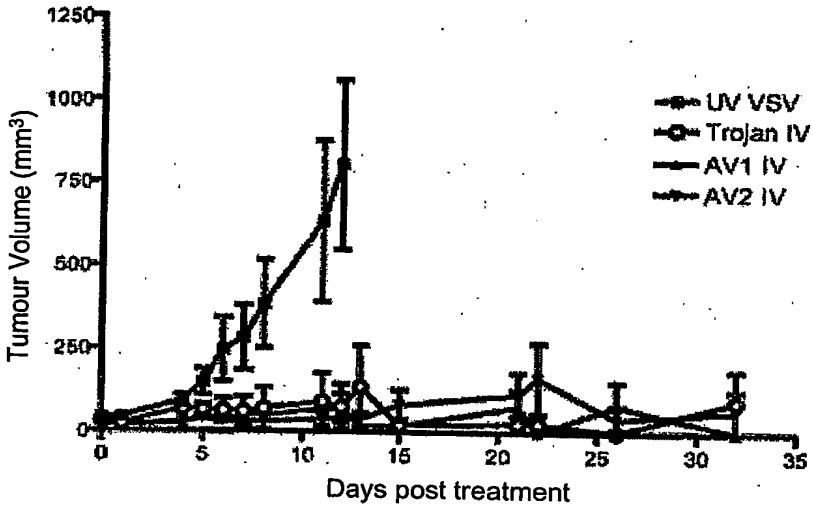

IFN-β/HPRT ratio (×10-5)
1000
100
1
N C N C N C N C N C N C
WT AV1 AV2 WT AV1 AV2
6 12
hours post infection
*

FIGURE 3

A



B



C

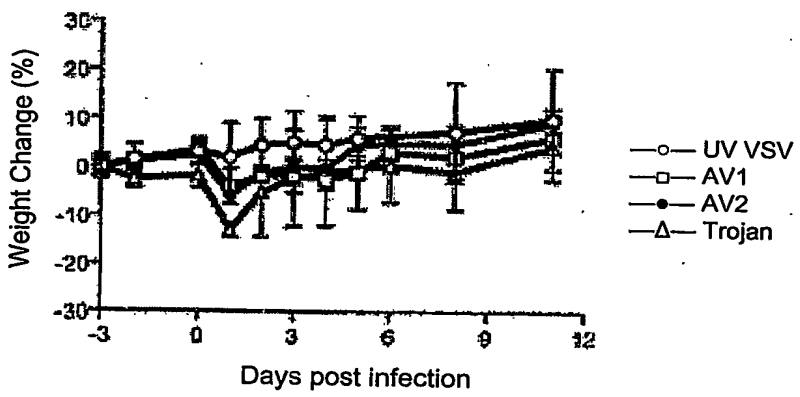
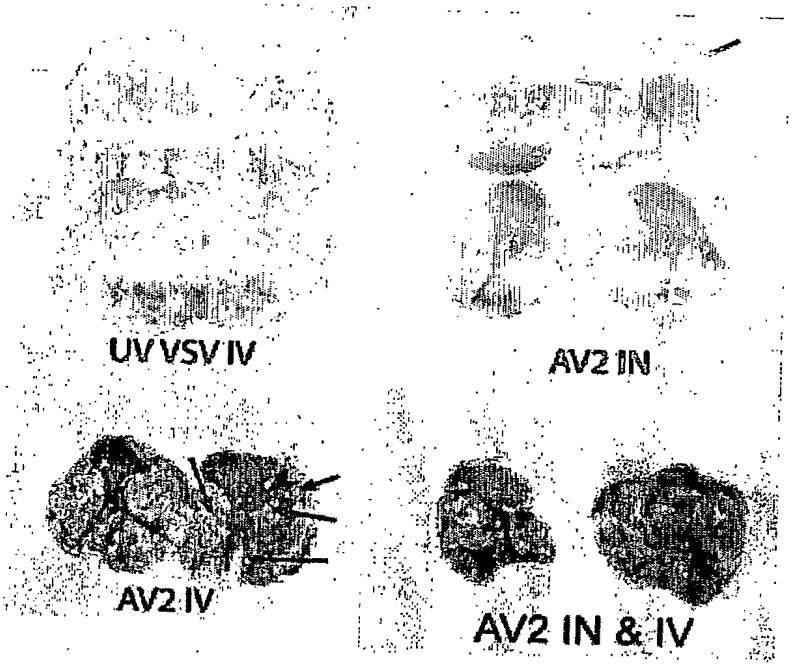


FIGURE 4A-C

D



E

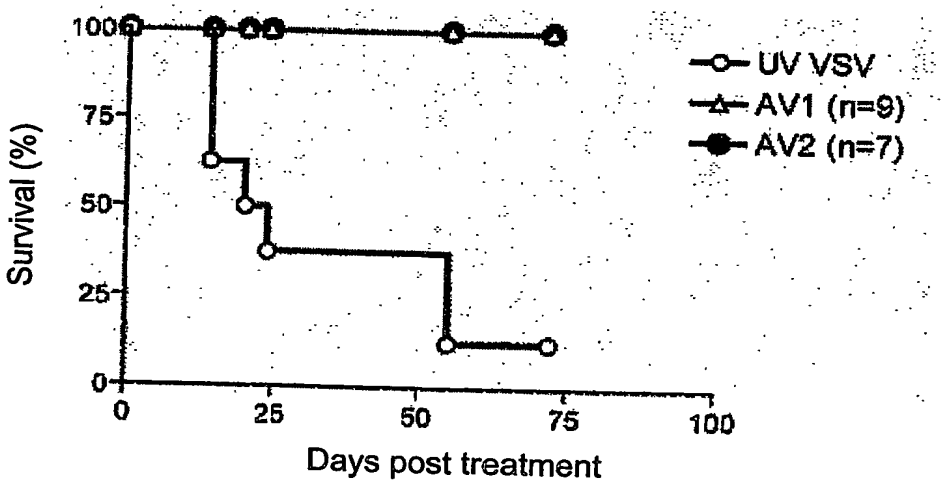
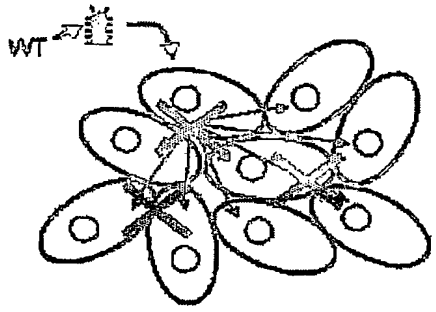


FIGURE 4D-E

A



B

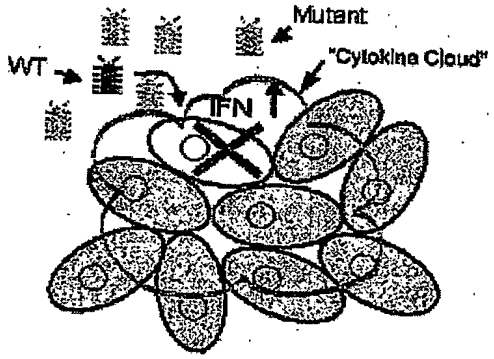
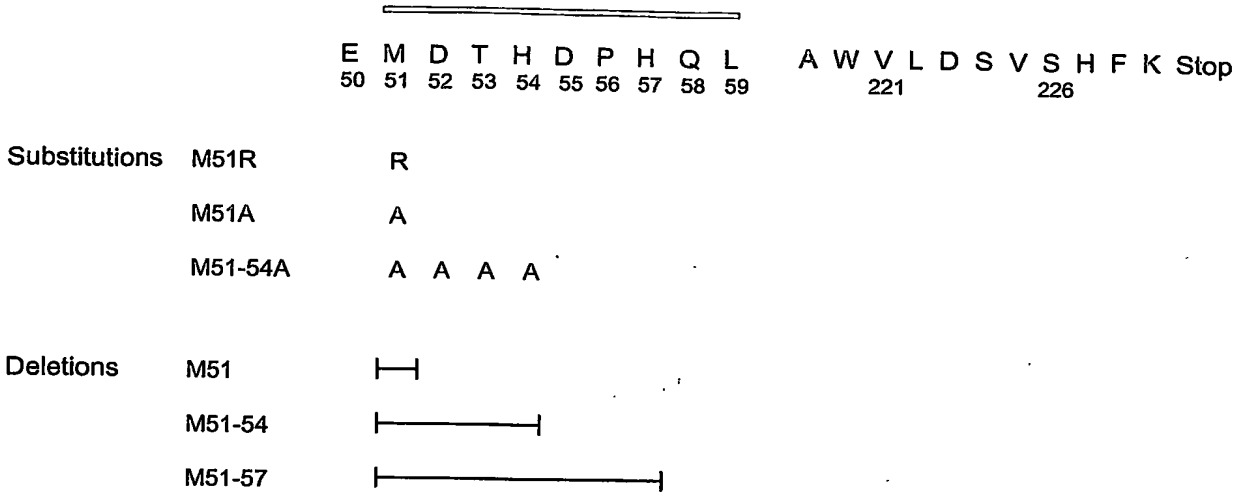


FIGURE 5

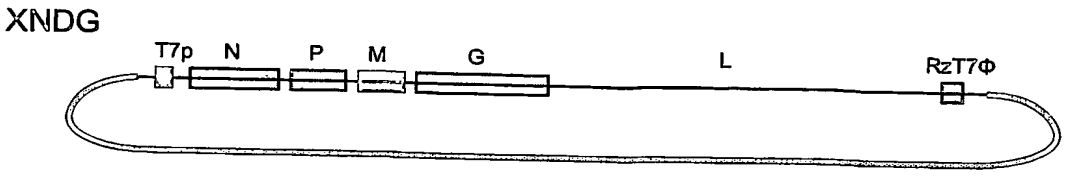


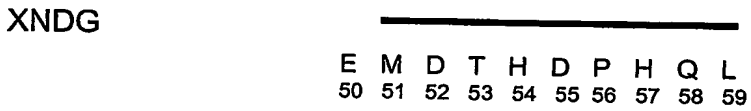
Mut2-like Mutants
M51R
M51A
M51-54A
ΔM51
ΔM51-54
ΔM51-57

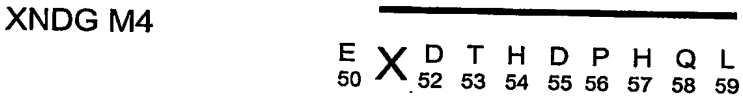
Mut3-like Mutants
V221F S226R
*S226R
*V221F
*ΔV221-S226

Compound Mutants
M51R & V221F S226R
M51A & V221F S226R
M51-54A & V221F S226R
ΔM51 & V221F S226R
ΔM51-54 & V221F S226R
ΔM51-57 & V221F S226R

FIGURE 6


XNDG
T7p
N
P
M
G
L
RzT7Φ


XNDG
E M D T H D P H Q L
50 51 52 53 54 55 56 57 58 59


XNDG M4
E X D T H D P H Q L
50 52 53 54 55 56 57 58 59

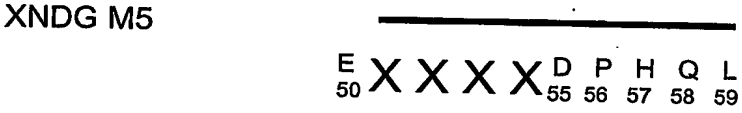

XNDG M5
E X X X X D P H Q L
50 55 56 57 58 59

FIGURE 7

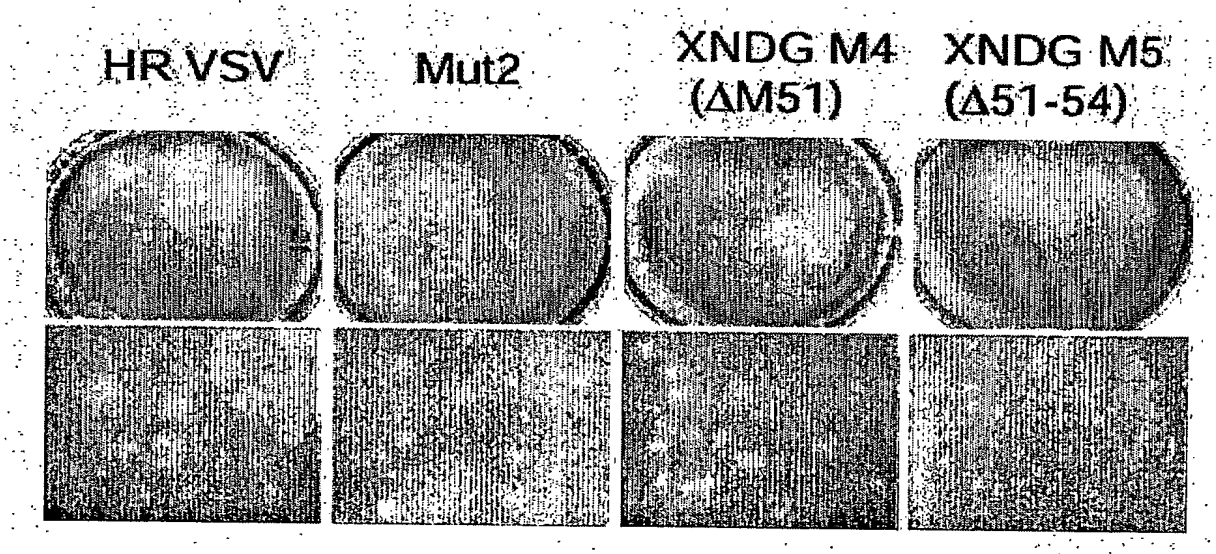


FIGURE 8

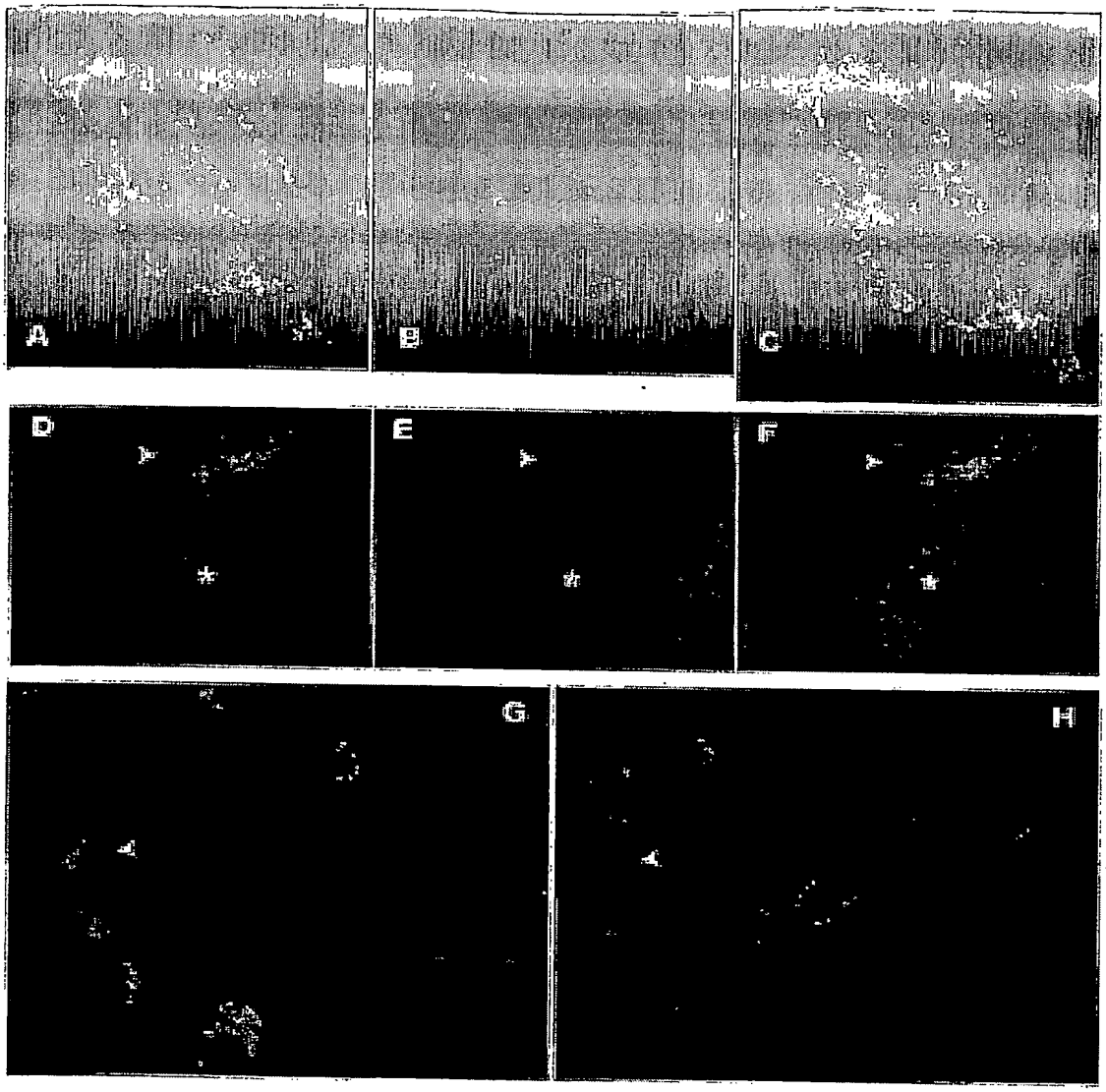


FIGURE 9A-H

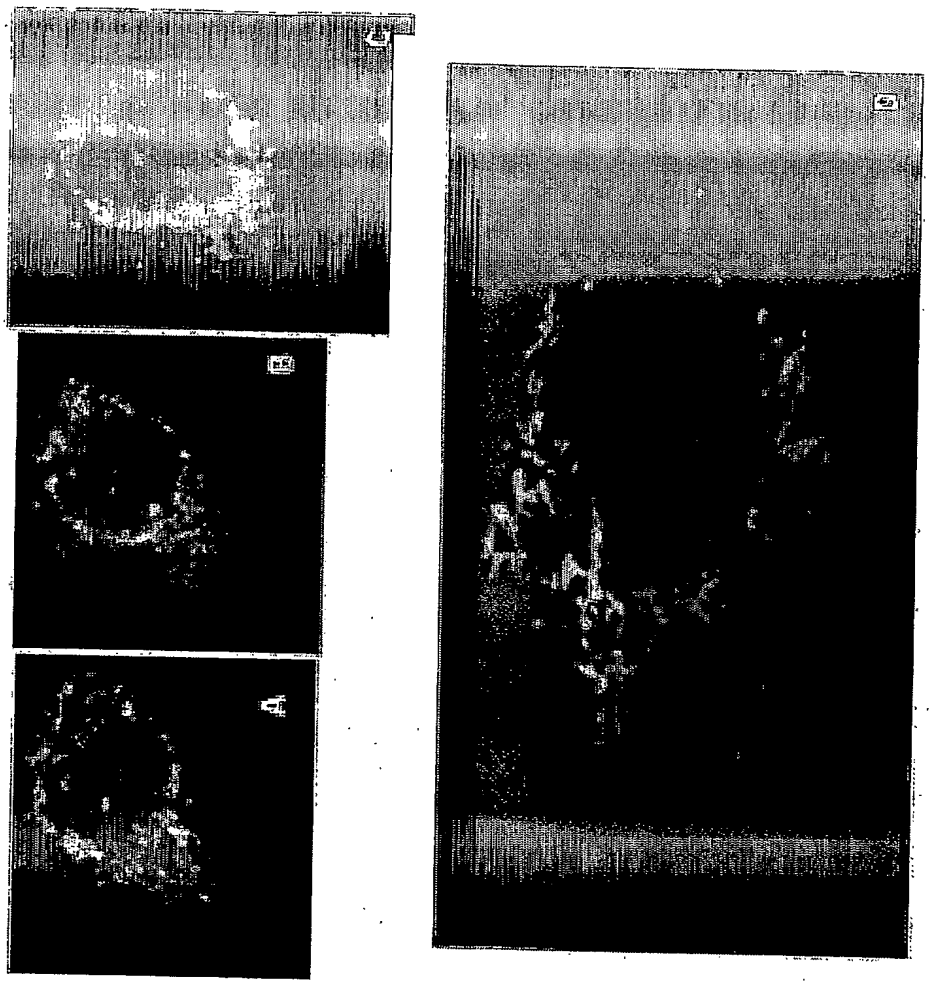


FIGURE 10

Genome Sequence for VSV Mutant AV1

ACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAACAGTAATCAAAATGTCTGTT
ACAGTCAAGAGAATCATTGACAACACAGTCATAGTTCCAAAACTTCCTGCAAATGAGGATCCAGTGGAATAC
CCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTACATCAATACTACAAAAAGTTTGTCAGATCTA
AGAGGATATGTCTACCAAGGCCTCAAATCCGGAAATGTATCAATCATACATGTCAACAGCTACTTGTATGGA
GCATTGAAGGACATCCGGGGTAAGTTGGATAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAGGCAGGG
GATACAATCGGAATATTTGACCTTGTATCCTTGAAAGCCCTGGACGGTGTACTTCCAGATGGAGTATCGGAT
GCTTCCAGAACCAGCGCAGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACA
CAAATGCCTGAATACAGAAAAAGGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTT
GAACCTCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGTC
GCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAACTATTGTT
TCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGGAATGTCTACAGAA
GATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAGATGGTCCAAATGATGCTTCCAGGCCAAGAA
ATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATTGTCTTCTAAGTCTCCATATTCTTCC
GTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGCTCTTCTGCTCAGATCTACCAGAGCAAGGAAT
GCCCGACAGCCTGATGACATTGAGTATACATCTCTTACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGA
TCCTCTGCTGACTTGGCACAACAGTTTTGTGTTGGAGATAGCAAATACACTCCAGATGATAGTACCGGAGGA
TTGACGACTAATGCACCGCCACAAGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGA
AAACCGACTCCTGATATGATGCAGTATGCGAAACGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACA
ATTGGCAAGTATGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCAGATCACCTATTATATATTATGC
TACATATGAAAAAAACTAACAGATATCATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCT
CGTCTAGATCAGGCGGTAGGAGAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTG
TTCCAAGAGGACGGAGTGGAAGAGCATACTAGGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAA
TCTGAACCAGAAATTGAAGACAATCAAGGCTTGTATGTACCAGATCCGGAAGCTGAGCAAGTTGAAGGCTTT
ATACAGGGGCCTTTAGATGACTATGCGGATGAGGACGTGGATGTTGTATTCACTTCGGACTGGAAACAGCCT
GAGCTTGAATCCGACGAGCATGGAAAGACCTTACGGTTGACATTGCCAGAGGGTTTAAGTGGAGAGCAGAAA
TCCCAGTGGCTTTTGACGATTAAAGCAGTCGTTCAAAGTGCCAAACACTGGAATCTGGCAGAGTGCACATTT
GAAGCATCGGGAGAAGGGGTCATCATAAAAAAGCGCCAGATAACTCCGGATGTATATAAGGTCACTCCAGTG
ATGAACACACATCCGTCCCAATCAGAAGCCGTATCAGATGTTTGGTCTCTCTCAAAGACATCCATGACTTTC
CAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCCTTGGATGAATTGTTCTCATCTAGAGGAGAATTC
ATCTCTGTCGGAGGTAACGGACGAATGTCTCATAAAGAGGCCATCCTGCTCGGTCTGAGGTACAAAAAGTTG
TACAATCAGGCGAGAGTCAAATATTCTCTGTAGACTATGAAAAAAAGTAACAGATATCACAATCTAAGTGTT
ATCCCAATCCATTCATCATGAGTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGA
AATTAGGGATCGCACCACCCCCTTATGAAGAGGACACTAACATGGAGTATGCTCCGAGCGCTCCAATTGACA
AATCCTATTTTGGAGTTGACGAGAGGGACACTCATGATCCGCATCAATTAAGATATGAGAAATTCTTCTTTA
CAGTGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCCATT

FIGURE 11

GGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAGATCTTGGCTTTTTTGGGTTCTTCTA
ATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTCACTGTGAAGGCAGGG
CTTATTTGCCACACAGAATGGGGAAGACCCCTCCCATGCTCAATGTACCAGAGCACTTCAGAAGACCATTCA
ATATAGGTCTTTACAAGGGAACGGTTGAGCTCACAATGACCATCTACGATGATGAGTCACTGGAAGCAGCTC
CTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTGATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGA
TTGTCGAGAAAAAGGCATCTGGAGCTTGGGTCCTGGATTCTGTCAGCCACTTCAAATGAGCTAGTCTAGCTT
CCAGCTTCTGAACAATCCCCGGTTTACTCAGTCTCTCCTAATTCCAGCCTTTCGAACAACTAATATCCTGTC
TTTTCTATCCCTATGAAAAAAACTAACAGAGATCGATCTGTTTCCTTGACACCATGAAGTGCCTTTTGTACT
TAGCTTTTTTATTCATCGGGGTGAATTGCAAGTTCACCATAGTTTTTCCATACAACCGAAAAGGAAACTGGA
AAAATGTTCCTTCCAATTACCATTATTGCCCGTCAAGCTCAGATTTAAATTGGCATAATGACTTAATAGGCA
CAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAGGCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCA
AATGGGTCACTACTTGTGATTTCCGCTGGTACGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTC
CATCTGTAGAACAATGCAAGGAAAGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTC
CTCAAAGTTGTGGATATGCAACTGTGACGGATGCTGAAGCAGCGATTGTCCAGGTGACTCCTCACCATGTGC
TTGTTGATGAATACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATGACATATGCC
CCACTGTCCATAACTCCACAACCTGGCATTCCGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATTT
CCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTAGGAAAGGAGGGCACAGGGTTCAGAA
GTAACTACTTTGCTTATGAAACTGGAGACAAGGCCTGCAAAATGCAGTACTGCAAGCATTGGGGAGTCAGAC
TCCCATCAGGTGTCTGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCCAGATTCCCTGAATGCCCAG
AAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGTCTCATTCAGGACGTTGAGAGGATCT
TGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGAGCGGGTCTTCCCATCTCTCCAGTGGATCTCA
GCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCTGTCTTTACCATAATCAATGGTACCCTAAAATACTTTG
AGACCAGATACATCAGAGTCGATATTGCTGCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTA
CCACAGAAAGGGAACTGTGGGATGACTGGGCTCCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGA
GGACCAGTTCAGGATATAAGTTTCCTTTATATATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTA
GCTCAAAGGCTCAGGTGTTTGAACATCCTCACATTCAAGACGCTGCTTCGCAGCTTCCTGATGATGAGACTT
TATTTTTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGTTTGTAGAAGGTTGGTTCAGTAGTTGGAAGA
GCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTTGGTATTT
ATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATGAACCGACTTGGGA
AGTAACTCAAATCCTGCACAACAGATTCTTCATGTTTGAACCAAATCAACTTGTGATATCATGCTCAAAGAG
GCCTTAATTATATTTTAATTTTTAATTTTTATGAAAAAAACTAACAGCAATCATGGAAGTCCACGATTTTGA
GACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGAGAATTCCTGAATCCCGATGAGCGCAT
GACGTACTTGAATCATGCTGATTACAATTTGAATTCTCCTCTAATTAGTGATGATATTGACAATTTGATCAG
GAAATTCAATTCTCTTCCGATTCCCTCGATGTGGGATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAAC
ATCATGTCAAGCCAATCCCATCTCAACATCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAA
TCATGATGCCAGTCAAGGGTATAGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGT

FIGURE 11 continued

GGAGACCTTCATCCGCGGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATT
CAAAATTCTCGCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTC
TGAGGTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAACAT
ATGCAGGCTTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAGAAACTTGA
TATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATGCAAACGGTGCTATC
CATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTTCTAAATATCTACAGAATTGG
AGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATTAAAATGGTGGAACCGATATGCAACTT
GAGGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTCCCACAATTCCCTCATTTTGAAAATCATATCAA
GACTTCTGTTGATGAAGGGGCAAAAATTGACCGAGGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAA
AACAGTGGATCTCACACTGGTGATTTATGGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACGC
TGGACTAGAAAAATTACATTCCCAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGC
AAGTGATTTAGCTCGGATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTT
GCTCCCTCATGATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGA
TTTTGGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCGAT
AATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAATCCGAACAC
TCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGGAAAGAATTTCTTAA
AGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGtCTTAAAGGAAAGGAGAGGGAACTGAA
GTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAATACTTTGTAATTACCGAATATTTGAT
AAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATGGCGGACGATCTAACTGCAGTCATTAAAAAGAT
GTtAGATTCCTCATCCGGCCAAGGATTGAAGTCATATGAGGCAATTTGCATAGCCAATCACATTGATTACGA
AAAATGGAATAACCACCAAAGGAAGTTATCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTA
TCCATCCTTAATCGAGAGAACTCATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTT
GATGCGTGTTCACAACAACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGG
ACTGGAAGGTCTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAG
AAACACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAATC
GAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATGACTGCAAT
CAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCTGCAGATTACTTGAA
TTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGaCCAAGAGATGGTCACGAGTGACTTG
TGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCAGTTTCCACAAATGCTCTCACCGTAGC
TCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTACAATTATTTTGGGACATTTGCTAGACTCTTGTT
GATGATGCATGATCCTGCTCTTCGTCAATCATTGTATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTC
TACTTTCAAATACGCCATGTTGTATTTGGACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTT
TTTGATTAGAGCCTTCCCAGATCCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTaCATGCTCG
AAGTGAGCATCTGAAGGAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACAT
AGACAAGCTAGTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGAC
TGAGGTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATATA

FIGURE 11 continued

TTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGATTTTTAAG
TGAATTCAAATCAGGCACTTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAAAATTCTCGTACTAT
TCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTGAGGAGTGAGGTATCCTCTTT
GACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATGTGGACATGTTCAGCTACTCATGCTGA
CACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGGACAACTGTACCCCATCCATTAGAAATGTTGGG
TCCACAACATCGAAAAGAGACTCCTTGTGCACCATGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTG
TCCAGACGGGATCCATGACGTCTTTAGTTCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGA
ATCTACATCTATTTTGCAGCCTTGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAG
AGATGCTATCTCTTGGTTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTT
AACAGGCGAAGAATGGACCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGAC
ATCTCGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAACTACAGA
CACCATGAGGGATCTGGGAGATCAGAaTTTCGACTTTTTATTCCAGGCAACGTTGCTCTATGCTCAGATTAC
CACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCCTGTAAGTCCTGTTT
GAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCAGATGTATCCCATGTGCTGAA
GACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAGATCTATCCTTTAGAAGGGAATTGGAA
GAATTTAGCACCTGCTGAGCAATCCTATCAAGTCGGCAGATGTATAGGTTTTCTATATGGAGACTTGGCGTA
TAGAAAATCTACTCATGCCGAGGACAGTTCTCTATTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGG
TTTCTTAAAAGGGTTGCTAGACGGATTAATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGC
TCATTTGAAGAGGCCGGCCAACGCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGTATCACC
TCCATTCCTTTCTCTTACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAAC
CTCCTATCCGACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAAT
TGAAAAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTCAT
TGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAAGATAAGAA
TGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAAGACATACATGTAAA
ATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGCAAGTTCGGGATTGCTAAGGA
TAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGAGGGACAATTACAACAATCCCTGTTTA
TTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCTCCAAGAATCCAAAATCCCCTGCTGTCCGGAAT
CAGGTTGGGCCAGTTACCAACTGGCGCTCATTATAAAATTCGGAGTATATTACATGGAATGGGAATCCATTA
CAGGGACTTCTTGAGTTGTGGAGACGGCTCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAG
CAGAGGAATATTCAATAGTCTGTTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAG
TGCCCTAGAAACTTTAGGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGA
CTTATGTGACCCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAAT
TGTAATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTGCA
CCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGCGAAAAGAA
TGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTTAGTAGTTCTCAAAC
GTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCCAATCCCGATTGGTCTTCCAT

FIGURE 11 continued

CAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAGGAATTTGCCAGAGCAAAGAAGGTTAG
TACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATTCCTGATCCTTTTGTAAACATTGAGACTATGCT
ACAAATATTCGGAGTACCCACGGGTGTGTCTCATGCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTT
ATTGACCATTAGCCTTTTTTATATGGCGATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGAT
ACCTCCGAACCCCCCATCAGATGGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCT
GAGTTTGATGGAGAAAGACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAG
GTGGGAGGCTGTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGA
TACCCGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAAGT
TCGTCTGAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTGAAATGGTC
AAATTTGCGAAAAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAAGACCGGTCTATACT
GATGTTGAAGAGTGACCTACATGAGGAAAACTCTTGGAGAGATTAAAAAATCATGAGGAGACTCCAAACTTT
AAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTATTTTTTATCTGGTTTTGTGGTCTTCG
T

FIGURE 11 continued

Nucleic Acid Sequence of the M Protein Gene for VSV Mutant AV1

ATGAGTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCACCA
CCCCCTTATGAAGAGGACACTAACATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATTTTGGAGTT
GACGAGATGGACACTCATGATCCGCATCAATTAAGATATGAGAAATTCTTCTTTACAGTGAAAATGACGGTT
AGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCCATTGGGATCACATGTACATC
GGAATGGCAGGGAAACGTCCCTTCTACAAGATCTTGGCTTTTTTGGGTTCTTCTAATCTAAAGGCCACTCCA
GCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTCACTGTGAAGGCAGGGCTTATTTGCCACACAGA
ATGGGGAAGACCCCTCCCATGCTCAATGTACCAGAGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAG
GGAACGGTTGAGCTCACAATGACCATCTACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCAT
TTCAATTCTTCCAAATTTTCTGATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCA
TCTGGAGCTTGGTTCCTGGATTCTGTCAGACACTTCAAATGA

FIGURE 12

Amino Acid Sequence for the M Protein of VSV Mutant AV1

MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTNMEYAPSAPIDKSYFGVDERDTHDPHQLRYEKFFFTVKMTV
RSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFYKILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHR
MGKTPPMLNVPEHFRRPFNIGLYKGTVELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKA
SGAWVLDSVSHFK.

FIGURE 13

Genome sequence for VSV Mutant AV2

ACGAAGACAAACAAACCATTATTATCATTAAAAGGCTCAGGAGAAACTTTAACAGTAATCAAAATGTCTGTT
ACAGTCAAGAGAATCATTGACAACACAGTCATAGTTCCAAAACTTCCTGCAAATGAGGATCCAGTGGAATAC
CCGGCAGATTACTTCAGAAAATCAAAGGAGATTCCTCTTTACATCAATACTACAAAAAGTTTGTCAGATCTA
AGAGGATATGTCTACCAAGGCCTCAAATCCGGAAATGTATCAATCATACATGTCAACAGCTACTTGTATGGA
GCATTGAAGGACATCCGGGGTAAGTTGGATAAAGATTGGTCAAGTTTCGGAATAAACATCGGGAAGGCAGGG
GATACAATCGGAATATTTGACCTTGTATCCTTGAAAGCCCTGGACGGTGTACTTCCAGATGGAGTATCGGAT
GCTTCCAGAACCAGCGCAGATGACAAATGGTTGCCTTTGTATCTACTTGGCTTATACAGAGTGGGCAGAACA
CAAATGCCTGAATACAGAAAAAGGCTCATGGATGGGCTGACAAATCAATGCAAAATGATCAATGAACAGTTT
GAACCTCTTGTGCCAGAAGGTCGTGACATTTTTGATGTGTGGGGAAATGACAGTAATTACACAAAAATTGTC
GCTGCAGTGGACATGTTCTTCCACATGTTCAAAAAACATGAATGTGCCTCGTTCAGATACGGAACTATTGTT
TCCAGATTCAAAGATTGTGCTGCATTGGCAACATTTGGACACCTCTGCAAAATAACCGGAATGTCTACAGAA
GATGTAACGACCTGGATCTTGAACCGAGAAGTTGCAGATGAGATGGTCCAAATGATGCTTCCAGGCCAAGAA
ATTGACAAGGCCGATTCATACATGCCTTATTTGATCGACTTTGGATTGTCTTCTAAGTCTCCATATTCTTCC
GTCAAAAACCCTGCCTTCCACTTCTGGGGGCAATTGACAGCTCTTCTGCTCAGATCCACCAGAGCAAGGAAT
GCCCGACAGCCTGATGACATTGAGTATACATCTCTTACTACAGCAGGTTTGTTGTACGCTTATGCAGTAGGA
TCCTCTGCTGACTTGGCACAACAGTTTTGTGTTGGAGATAGCAAATACACTCCAGATGATAGTACCGGAGGA
TTGACGACTAATGCACCGCCACAAGGCAGAGATGTGGTCGAATGGCTCGGATGGTTTGAAGATCAAAACAGA
AAACCGACTCCTGATATGATGCAGTATGCGAAACGAGCAGTCATGTCACTGCAAGGCCTAAGAGAGAAGACA
ATTGGCAAGTATGCTAAGTCAGAATTTGACAAATGACCCTATAATTCTCAGATCACCTATTATATATTATGC
TACATATGAAAAAAACTAACAGATATCATGGATAATCTCACAAAAGTTCGTGAGTATCTCAAGTCCTATTCT
CGTCTAGATCAGGCGGTAGGAGAGATAGATGAGATCGAAGCACAACGAGCTGAAAAGTCCAATTATGAGTTG
TTCCAAGAGGACGGAGTGGAAGAGCATACTAGGCCCTCTTATTTTCAGGCAGCAGATGATTCTGACACAGAA
TCTGAACCAGAAATTGAAGACAATCAAGGCTTGTATGTACCAGATCCGGAAGCTGAGCAAGTTGAAGGCTTT
ATACAGGGGCCTTTAGATGACTATGCGGATGAGGACGTGGATGTTGTATTCACTTCGGACTGGAAACAGCCT
GAGCTTGAATCCGACGAGCATGGAAAGACCTTACGGTTGACATTGCCAGAGGGTTTAAGTGGAGAGCAGAAA
TCCCAGTGGCTTTTGACGATTAAAGCAGTCGTTCAAAGTGCCAAACACTGGAATCTGGCAGAGTGCACATTT
GAAGCATCGGGAGAAGGGGTCATCATAAAAAAGCGCCAGATAACTCCGGATGTATATAAGGTCACTCCAGTG
ATGAACACACATCCGTCCCAATCGGAAGCCGTATCAGATGTTTGGTCTCTCTCAAAGACATCCATGACTTTC
CAACCCAAGAAAGCAAGTCTTCAGCCTCTCACCATATCCTTGGATGAATTGTTCTCATCTAGAGGAGAATTC
ATCTCTGTCGGAGGTAACGGACGAATGTCTCATAAAGAGGCCATCCTGCTCGGTCTGAGGTACAAAAAGTTG
TACAATCAGGCGAGAGTCAAATATTCTCTGTAGACTATGAAAAAAAGTAACAGATATCACAATCTAAGTGTT
ATCCCAATCCATTCATCATGAGTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGA
AATTAGGGATCGCACCACCCCCTTATGAAGAGGACACTAACATGGAGTATGCTCCGAGCGCTCCAATTGACA
AATCCTATTTTGGAGTTGACGAGATGGACACTCATGATCCGCATCAATTAAGATATGAGAAATTCTTCTTTA
CAGTGAAAATGACGGTTAGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCCATT

Figure 14

GGGATCACATGTACATCGGAATGGCAGGGAAACGTCCCTTCTACAAGATCTTGGCTTTTTTGGGTTCTTCTA
ATCTAAAGGCCACTCCAGCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTCACTGTGAAGGCAGGG
CTTATTTGCCACACAGAATGGGGAAGACCCCTCCCATGCTCAATGTACCAGAGCACTTCAGAAGACCATTCA
ATATAGGTCTTTACAAGGGAACGGTTGAGCTCACAATGACCATCTACGATGATGAGTCACTGGAAGCAGCTC
CTATGATCTGGGATCATTTCAATTCTTCCAAATTTTCTGATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGA
TTGTCGAGAAAAAGGCATCTGGAGCTTGGTTCCTGGATTCTGTCAGACACTTCAAATGAGCTAGTCTAGCTT
CCAGCTTCTGAACAATCCCCGGTTTACTCAGTCTCTCCTAATTCCAGCCTTTCGAACAACTAATATCCTGTC
TTTTCTATCCCTATGAAAAAAACTAACAGAGATCGATCTGTTTCCTTGACACCATGAAGTGCCTTTTGTACT
TAGCTTTTTTATTCATCGGGGTGAATTGCAAGTTCACCATAGTTTTTCCATACAACCAAAAAGGAAACTGGA
AAAATGTTCCTTCCAATTACCATTATTGCCCGTCAAGCTCAGATTTAAATTGGCATAATGACTTAATAGGCA
CAGCCTTACAAGTCAAAATGCCCAAGAGTCACAAGGCTATTCAAGCAGACGGTTGGATGTGTCATGCTTCCA
AATGGGTCACTACTTGTGATTTCCGCTGGTACGGACCGAAGTATATAACACATTCCATCCGATCCTTCACTC
CATCTGTAGAACAATGCAAGGAAAGCATTGAACAAACGAAACAAGGAACTTGGCTGAATCCAGGCTTCCCTC
CTCAAAGTTGTGGATATGCAACTGTGACGGATGCTGAAGCAGCGATTGTCCAGGTGACTCCTCACCATGTGC
TTGTTGATGAATACACAGGAGAATGGGTTGATTCACAGTTCATCAACGGAAAATGCAGCAATGACATATGCC
CCACTGTCCATAACTCCACAACCTGGCATTCCGACTATAAGGTCAAAGGGCTATGTGATTCTAACCTCATTT
CCATGGACATCACCTTCTTCTCAGAGGACGGAGAGCTATCATCCCTAGGAAAGGAGGGCACAGGGTTCAGAA
GTAACTACTTTGCTTATGAAACTGGAGACAAGGCCTGCAAAATGCAGTACTGCAAGCGTTGGGGAGTCAGAC
TCCCATCAGGTGTATGGTTCGAGATGGCTGATAAGGATCTCTTTGCTGCAGCCAGATTCCCTGAATGCCCAG
AAGGGTCAAGTATCTCTGCTCCATCTCAGACCTCAGTGGATGTAAGTCTCATTCAGGACGTTGAGAGGATCT
TGGATTATTCCCTCTGCCAAGAAACCTGGAGCAAAATCAGAGCGGGTCTTCCCATCTCTCCAGTGGATCTCA
GCTATCTTGCTCCTAAAAACCCAGGAACCGGTCCTGTCTTTACCATAATCAATGGTACCCTAAAATACTTTG
AGACCAGATACATCAGAGTCGATATTGCTGCTCCAATCCTCTCAAGAATGGTCGGAATGATCAGTGGAACTA
CCACAGAAAGGGAACTGTGGGATGACTGGGCTCCATATGAAGACGTGGAAATTGGACCCAATGGAGTTCTGA
GGACCAGTTCAGGATATAAGTTTCCTTTATATATGATTGGACATGGTATGTTGGACTCCGATCTTCATCTTA
GCTCAAAGGCTCAGGTGTTTGAACATCCTCACATTCAAGACGCTGCTGCGCAGCTTCCTGATGATGAGACTT
TATTTTTTGGTGATACTGGGCTATCCAAAAATCCAATCGAGTTTGTAGAAGGTTGGTTCAGTAGTTGGAAGA
GCTCTATTGCCTCTTTTTTCTTTATCATAGGGTTAATCATTGGACTATTCTTGGTTCTCCGAGTTGGTATTT
ATCTTTGCATTAAATTAAAGCACACCAAGAAAAGACAGATTTATACAGACATAGAGATGAACCGACTTGGGA
AGTAACTCAAATCCTGCACAACAGATTCTTCATGTTTGAACCAAATCAACTTGTGATATCATGCTCAAAGAG
GCCTTAATTATATTTTAATTTTTAATTTTTATGAAAAAAACTAACAGCAATCATGGAAGTCCACGATTTTGA
GACCGACGAGTTCAATGATTTCAATGAAGATGACTATGCCACAAGAGAATTCCTGAATCCCGATGAGCGCAT
GACGTACTTGAATCATGCTGATTACAATTTGAATTCTCCTCTAATTAGTGATGATATTGACAATTTGATCAG
GAAATTCAATTCTCTTCCGATTCCCTCGATGTGGGATAGTAAGAACTGGGATGGAGTTCTTGAGATGTTAAC
ATCATGTCAAGCCAATCCCATCTCAACATCTCAGATGCATAAATGGATGGGAAGTTGGTTAATGTCTGATAA
TCATGATGCCAGTCAAGGGTATAGTTTTTTACATGAAGTGGACAAAGAGGCAGAAATAACATTTGACGTGGT

Figure 14 continued

GGAGACCTTCATCCGCGGCTGGGGCAACAAACCAATTGAATACATCAAAAAGGAAAGATGGACTGACTCATT
CAAAATTCTCGCTTATTTGTGTCAAAAGTTTTTGGACTTACACAAGTTGACATTAATCTTAAATGCTGTCTC
TGAGGTGGAATTGCTCAACTTGGCGAGGACTTTCAAAGGCAAAGTCAGAAGAAGTTCTCATGGAACGAACAT
ATGCAGGCTTAGGGTTCCCAGCTTGGGTCCTACTTTTATTTCAGAAGGATGGGCTTACTTCAAGAAACTTGA
TATTCTAATGGACCGAAACTTTCTGTTAATGGTCAAAGATGTGATTATAGGGAGGATGCAAACGGTGCTATC
CATGGTATGTAGAATAGACAACCTGTTCTCAGAGCAAGACATCTTCTCCCTTCTAAATATCTACAGAATTGG
AGATAAAATTGTGGAGAGGCAGGGAAATTTTTCTTATGACTTGATTAAAATGGTGGAACCGATATGCAACTT
GAAGCTGATGAAATTAGCAAGAGAATCAAGGCCTTTAGTCCCACAATTCCCTCATTTTGAAAATCATATCAA
GACTTCTGTTGATGAAGGGGCAAAAATTGACCGAGGTATAAGATTCCTCCATGATCAGATAATGAGTGTGAA
AACAGTGGATCTCACACTGGTGATTTATGGATCGTTCAGACATTGGGGTCATCCTTTTATAGATTATTACGC
TGGACTAGAAAAATTACATTCCCAAGTAACCATGAAGAAAGATATTGATGTGTCATATGCAAAAGCACTTGC
AAGTGATTTAGCTCGGATTGTTCTATTTCAACAGTTCAATGATCATAAAAAGTGGTTCGTGAATGGAGACTT
GCTCCCTCATGATCATCCCTTTAAAAGTCATGTTAAAGAAAATACATGGCCCACAGCTGCTCAAGTTCAAGA
TTTTGGAGATAAATGGCATGAACTTCCGCTGATTAAATGTTTTGAAATACCCGACTTACTAGACCCATCGAT
AATATACTCTGACAAAAGTCATTCAATGAATAGGTCAGAGGTGTTGAAACATGTCCGAATGAATCCGAACAC
TCCTATCCCTAGTAAAAAGGTGTTGCAGACTATGTTGGACACAAAGGCTACCAATTGGAAAGAATTTCTTAA
AGAGATTGATGAGAAGGGCTTAGATGATGATGATCTAATTATTGGTCTTAAAGGAAAGGAGAGGGAACTGAA
GTTGGCAGGTAGATTTTTCTCCCTAATGTCTTGGAAATTGCGAGAATACTTTGTAATTACCGAATATTTGAT
AAAGACTCATTTCGTCCCTATGTTTAAAGGCCTGACAATGGCGGACGATCTAACTGCAGTCATTAAAAAGAT
GTTAGATTCCTCATCCGGCCAAGGATTGAAGTCATATGAGGCAATTTGCATAGCCAATCACATTGATTACGA
AAAATGGAATAACCACCAAAGGAAGTTATCAAACGGCCCAGTGTTCCGAGTTATGGGCCAGTTCTTAGGTTA
TCCATCCTTAATCGAGAGAACTCATGAATTTTTTGAGAAAAGTCTTATATACTACAATGGAAGACCAGACTT
GATGCGTGTTCACAACAACACACTGATCAATTCAACCTCCCAACGAGTTTGTTGGCAAGGACAAGAGGGTGG
ACTGGAAGGTCTACGGCAAAAAGGATGGAGTATCCTCAATCTACTGGTTATTCAAAGAGAGGCTAAAATCAG
AAACACTGCTGTCAAAGTCTTGGCACAAGGTGATAATCAAGTTATTTGCACACAGTATAAAACGAAGAAATC
GAGAAACGTTGTAGAATTACAGGGTGCTCTCAATCAAATGGTTTCTAATAATGAGAAAATTATGACTGCAAT
CAAAATAGGGACAGGGAAGTTAGGACTTTTGATAAATGACGATGAGACTATGCAATCTGCAGATTACTTGAA
TTATGGAAAAATACCGATTTTCCGTGGAGTGATTAGAGGGTTAGAGACCAAGAGATGGTCACGAGTGACTTG
TGTCACCAATGACCAAATACCCACTTGTGCTAATATAATGAGCTCAGTTTCCACAAATGCTCTCACCGTAGC
TCATTTTGCTGAGAACCCAATCAATGCCATGATACAGTACAATTATTTTGGGACATTTGCTAGACTCTTGTT
GATGATGCATGATCCTGCTCTTCGTCAATCATTGTATGAAGTTCAAGATAAGATACCGGGCTTGCACAGTTC
TACTTTCAAATACGCCATGTTGTATTTGGACCCTTCCATTGGAGGAGTGTCGGGCATGTCTTTGTCCAGGTT
TTTGATTAGAGCCTTCCCAGATCCCGTAACAGAAAGTCTCTCATTCTGGAGATTCATCCATGTACATGCTCG
AAGTGAGCATCTGAAGGAGATGAGTGCAGTATTTGGAAACCCCGAGATAGCCAAGTTTCGAATAACTCACAT
AGACAAGCTAGTAGAAGATCCAACCTCTCTGAACATCGCTATGGGAATGAGTCCAGCGAACTTGTTAAAGAC
TGAGGTTAAAAAATGCTTAATCGAATCAAGACAAACCATCAGGAACCAGGTGATTAAGGATGCAACCATATA

Figure 14 continued

TTTGTATCATGAAGAGGATCGGCTCAGAAGTTTCTTATGGTCAATAAATCCTCTGTTCCCTAGATTTTTAAG
TGAATTCAAATCAGGCACTTTTTTGGGAGTCGCAGACGGGCTCATCAGTCTATTTCAAAATTCTCGTACTAT
TCGGAACTCCTTTAAGAAAAAGTATCATAGGGAATTGGATGATTTGATTGTGAGGAGTGAGGTATCCTCTTT
GACACATTTAGGGAAACTTCATTTGAGAAGGGGATCATGTAAAATGTGGACATGTTCAGCTACTCATGCTGA
CACATTAAGATACAAATCCTGGGGCCGTACAGTTATTGGGACAACTGTACCCCATCCATTAGAAATGTTGGG
TCCACAACATCGAAAAGAGACTCCTTGTGCACCATGTAACACATCAGGGTTCAATTATGTTTCTGTGCATTG
TCCAGACGGGATCCATGACGTCTTTAGTTCACGGGGACCATTGCCTGCTTATCTAGGGTCTAAAACATCTGA
ATCTACATCTATTTTGCAGCCTTGGGAAAGGGAAAGCAAAGTCCCACTGATTAAAAGAGCTACACGTCTTAG
AGATGCTATCTCTTGGTTTGTTGAACCCGACTCTAAACTAGCAATGACTATACTTTCTAACATCCACTCTTT
AACAGGCGAAGAATGGaCCAAAAGGCAGCATGGGTTCAAAAGAACAGGGTCTGCCCTTCATAGGTTTTCGAC
ATCTCGGATGAGCCATGGTGGGTTCGCATCTCAGAGCACTGCAGCATTGACCAGGTTGATGGCAaCTACAGA
CACCATGAGGGATCTGGGAGATCAGAATTTCGACTTTTTATTCCAGGCAACGTTGCTCTATGCTCAGATTAC
CACCACTGTTGCAAGAGACGGATGGATCACCAGTTGTACAGATCATTATCATATTGCCTGTAAGTCCTGTTT
GAGACCCATAGAAGAGATCACCCTGGACTCAAGTATGGACTACACGCCCCCAGATGTATCCCATGTGCTGAA
GACATGGAGGAATGGGGAAGGTTCGTGGGGACAAGAGATAAAACAGATCTATCCTTTAGAAGGGAATTGGAA
GAATTTAGCACCTGCTGAGCAATCCTATCAAGTCGGCAGATGTATAGGTTTTCTATATGGAGACTTGGCGTA
TAGAAAATCTACTCATGCCGAGGACAGTTCTCTATTTCCTCTATCTATACAAGGTCGTATTAGAGGTCGAGG
TTTCTTAAAAGGGTTGCTAGACGGATTAATGAGAGCAAGTTGCTGCCAAGTAATACACCGGAGAAGTCTGGC
TCATTTGAAGAGGCCGGCCAACGCAGTGTACGGAGGTTTGATTTACTTGATTGATAAATTGAGTGtATCACC
TCCATTCCTTTCTCTTACTAGATCAGGACCTATTAGAGACGAATTAGAAACGATTCCCCACAAGATCCCAAC
CTCCTATCCGACAAGCAACCGTGATATGGGGGTGATTGTCAGAAATTACTTCAAATACCAATGCCGTCTAAT
TGAAAAGGGAAAATACAGATCACATTATTCACAATTATGGTTATTCTCAGATGTCTTATCCATAGACTTCAT
TGGACCATTCTCTATTTCCACCACCCTCTTGCAAATCCTATACAAGCCATTTTTATCTGGGAAAGATAAGAA
TGAGTTGAGAGAGCTGGCAAATCTTTCTTCATTGCTAAGATCAGGAGAGGGGTGGGAAGACATACATGTAAA
ATTCTTCACCAAGGACATATTATTGTGTCCAGAGGAAATCAGACATGCTTGCAAGTTCGGGATTGCTAAGGA
TAATAATAAAGACATGAGCTATCCCCCTTGGGGAAGGGAATCCAGAGGGACAATTACAACAATCCCTGTTTA
TTATACGACCACCCCTTACCCAAAGATGCTAGAGATGCCTCCAAGAATCCAAAATCCCCTGCTGTCCGGAAT
CAGGTTGGGCCAGTTACCAACTGGCGCTCATTATAAAATTCGGAGTATATTACATGGAATGGGAATCCaTTA
CAGGGACTTCTTGAGTTGTGGAGACGGCTCCGGAGGGATGACTGCTGCATTACTACGAGAAAATGTGCATAG
CAGAGGAATATTCAATAGTCTGTTAGAATTATCAGGGTCAGTCATGCGAGGCGCCTCTCCTGAGCCCCCCAG
TGCCCTAGAAACTTTAGGAGGAGATAAATCGAGATGTGTAAATGGTGAAACATGTTGGGAATATCCATCTGA
CTTATGTGACCCAAGGACTTGGGACTATTTCCTCCGACTCAAAGCAGGCTTGGGGCTTCAAATTGATTTAAT
TGTAATGGATATGGAAGTTCGGGATTCTTCTACTAGCCTGAAAATTGAGACGAATGTTAGAAATTATGTGCA
CCGGATTTTGGATGAGCAAGGAGTTTTAATCTACAAGACTTATGGAACATATATTTGTGAGAGCGAAAAGAA
TGCAGTAACAATCCTTGGTCCCATGTTCAAGACGGTCGACTTAGTTCAAACAGAATTTAGTAGTTCTCAAAC
GTCTGAAGTATATATGGTATGTAAAGGTTTGAAGAAATTAATCGATGAACCCAATCCCGATTGGTCTTCCAT

Figure 14 continued

CAATGAATCCTGGAAAAACCTGTACGCATTCCAGTCATCAGAACAGGAATTTGCCAGAGCAAAGAAGGTTAG
TACATACTTTACCTTGACAGGTATTCCCTCCCAATTCATTCCTGATCCTTTTGTGAACATTGAGACTATGCT
ACAAATATTCGGAGTACCCACGGGTGTGTCTCATGCGGCTGCCTTAAAATCATCTGATAGACCTGCAGATTT
ATTGACCATTAGCCTTTTTTATATGGCGATTATATCGTATTATAACATCAATCATATCAGAGTAGGACCGAT
ACCTCCGAACCCCCCATCAGATGGAATTGCACAAAATGTGGGGATCGCTATAACTGGTATAAGCTTTTGGCT
GAGTTTGATGGAGAAAGACATTCCACTATATCAACAGTGTTTAGCAGTTATCCAGCAATCATTCCCGATTAG
GTGGGAGGCTGTTTCAGTAAAAGGAGGATACAAGCAGAAGTGGAGTACTAGAGGTGATGGGCTCCCAAAAGA
TACCCGAATTTCAGACTCCTTGGCCCCAATCGGGAACTGGATCAGATCTCTGGAATTGGTCCGAAACCAAGT
TCGTCTGAATCCATTCAATGAGATCTTGTTCAATCAGCTATGTCGTACAGTGGATAATCATTTGAAATGGTC
AAATTTGCGAAAAAACACAGGAATGATTGAATGGATCAATAGACGAATTTCAAAAGAAGACCGGTCTATACT
GATGTTGAAGAGTGACCTACATGAGGAAAACTCTTGGAGAGATTAAAAAATCATGAGGAGACTCCAAACTTT
AAGTATGAAAAAAACTTTGATCCTTAAGACCCTCTTGTGGTTTTTATTTTTTATCTGGTTTTGTGGTCTTCG
T

Figure 14 continued

Nucleic Acid Sequence of the M Protein Gene for VSV Mutant AV2

ATGAGTTCCTTAAAGAAGATTCTCGGTCTGAAGGGGAAAGGTAAGAAATCTAAGAAATTAGGGATCGCACCA
CCCCCTTATGAAGAGGACACTAACATGGAGTATGCTCCGAGCGCTCCAATTGACAAATCCTATTTTGGAGTT
GACGAGAGGGACACTCATGATCCGCATCAATTAAGATATGAGAAATTCTTCTTTACAGTGAAAATGACGGTT
AGATCTAATCGTCCGTTCAGAACATACTCAGATGTGGCAGCCGCTGTATCCCATTGGGATCACATGTACATC
GGAATGGCAGGGAAACGTCCCTTCTACAAGATCTTGGCTTTTTTGGGTTCTTCTAATCTAAAGGCCACTCCA
GCGGTATTGGCAGATCAAGGTCAACCAGAGTATCACGCTCACTGTGAAGGCAGGGCTTATTTGCCACACAGA
ATGGGGAAGACCCCTCCCATGCTCAATGTACCAGAGCACTTCAGAAGACCATTCAATATAGGTCTTTACAAG
GGAACGGTTGAGCTCACAATGACCATCTACGATGATGAGTCACTGGAAGCAGCTCCTATGATCTGGGATCAT
TTCAATTCTTCCAAATTTTCTGATTTCAGAGAGAAGGCCTTAATGTTTGGCCTGATTGTCGAGAAAAAGGCA
TCTGGAGCTTGGGTCCTGGATTCTGTCAGCCACTTCAAATGA

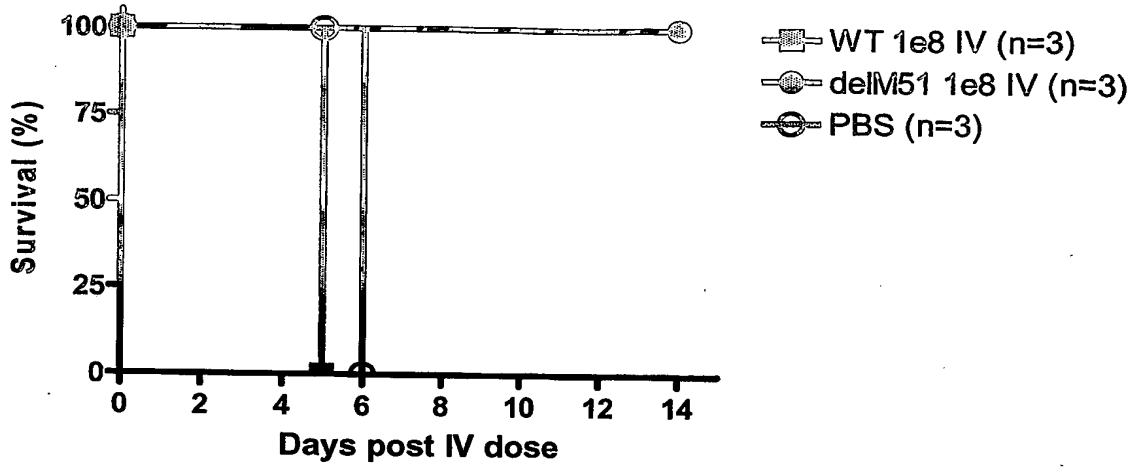
FIGURE 15

Amino Acid Sequence for the M Protein of VSV Mutant AV2

MSSLKKILGLKGKGKKSKKLGIAPPPYEEDTNMEYAPSAPIDKSYFGVDEMDTHDPHQLRYEKFFFTVKMTV
RSNRPFRTYSDVAAAVSHWDHMYIGMAGKRPFYKILAFLGSSNLKATPAVLADQGQPEYHAHCEGRAYLPHR
MGKTPPMLNVPEHFRRPFNIGLYKGTVELTMTIYDDESLEAAPMIWDHFNSSKFSDFREKALMFGLIVEKKA
SGAWFLDSVRHFK

FIGURE 16

A



B

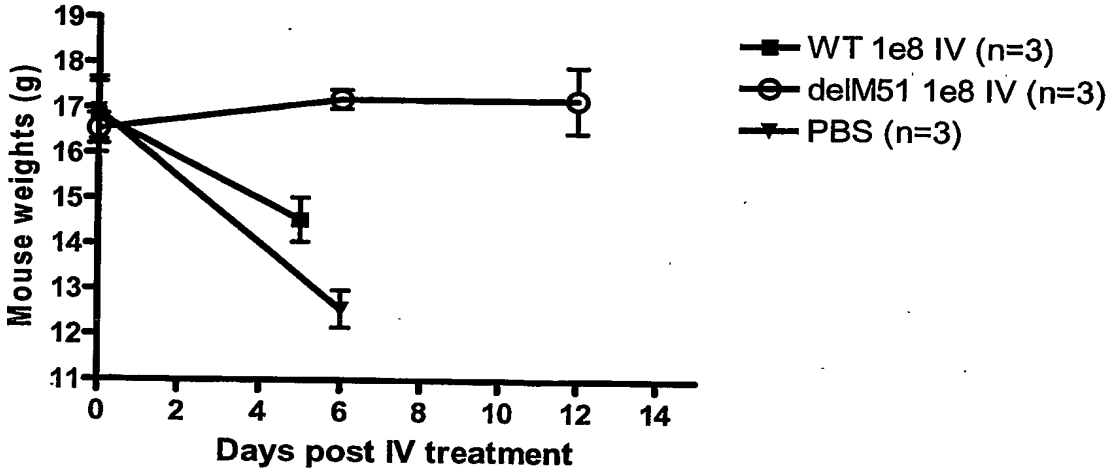


FIGURE 17A-B

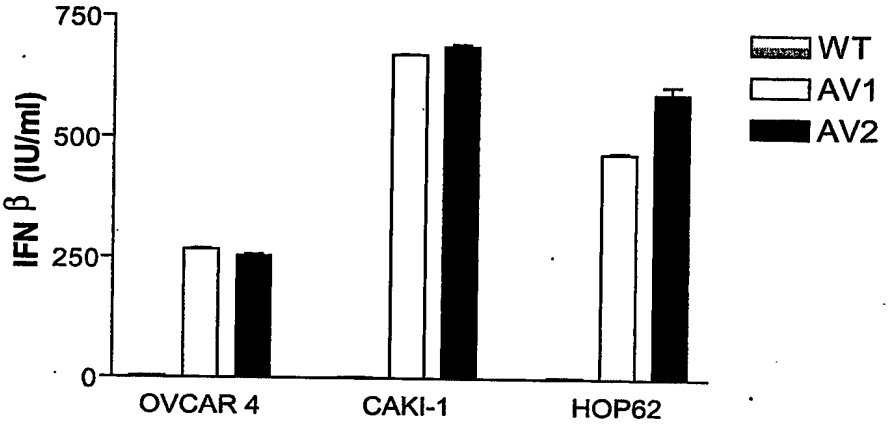
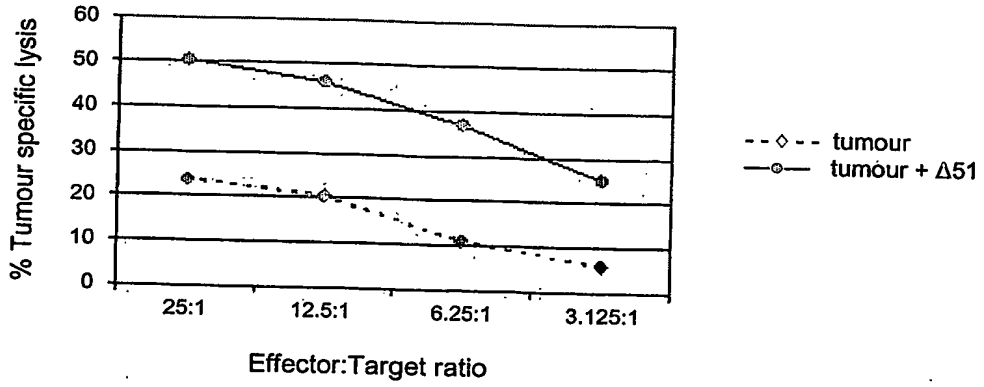


FIGURE 18

A


% Tumour specific lysis
60
50
40
30
20
10
0
25:1
12.5:1
6.25:1
3.125:1
Effector:Target ratio
tumour
tumour + Δ51

B

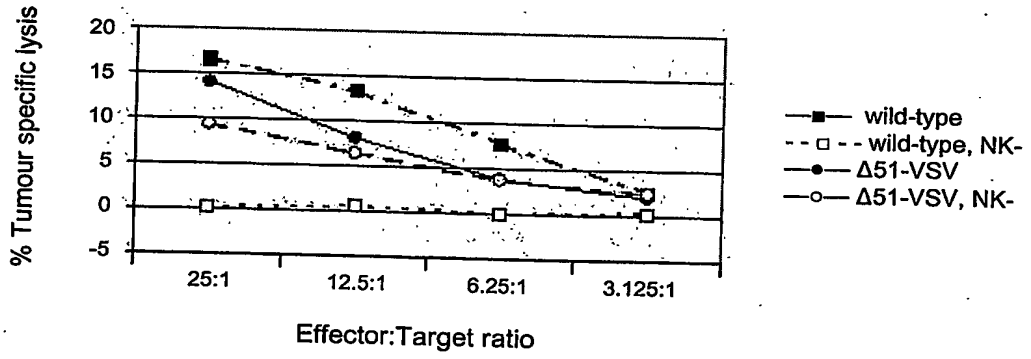

% Tumour specific lysis
20
15
10
5
0
-5
25:1
12.5:1
6.25:1
3.125:1
Effector:Target ratio
wild-type
wild-type, NK-
Δ51-VSV
Δ51-VSV, NK-

FIGURE 19

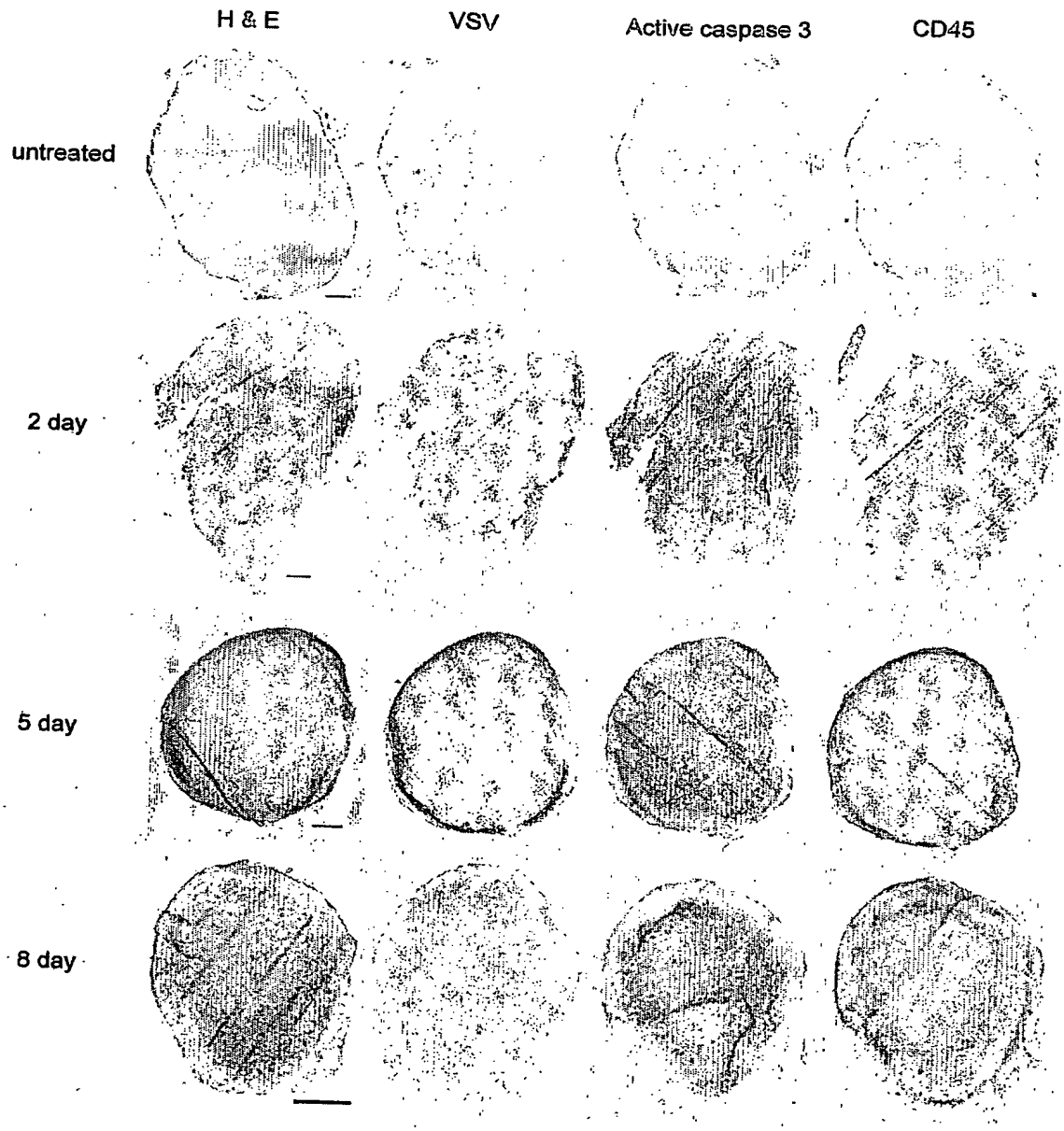


FIGURE 20